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Microwave method for drying hibiscus and bougainvillea

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Abstract
The study was conducted in Department of Floriculture and Landscaping, Tamil Nadu Agricultural University, Coimbatore. Hibiscus and Bougainvillea flowers were dried under microwave oven heat in different time interval (2.5 and 3.5) under different media (sand and borax) and observed changes in weight and colour. Among different media borax is suitable for drying at 2.5 minutes as these flower showed flexibility or retain as such without brittleness.

Keywords: Microwave method, drying hibiscus, bougainvillea

Introduction
The demand for dry flowers is increasing at an impressive rate of 8-10 per cent annually, thus offering a lot of opportunities for the Indian entrepreneurs to enter in the global floricultural trade (Singh 2009) [1]. A number of flowers such as anemone, zinnia, allium, sweet william, carnation, stock, freesia, narcissus, chrysanthemum, pansy, daffodils, marigold, rose and lilies respond well to drying techniques (Rogers, 1988) [2]. For drying fresh flowers, different methods of drying have been followed like air drying, embedded drying, press drying, oven drying etc. In this exercise, microwave techniques has been followed at different timings and analysed for moisture loss (%) and colour retention of flowers after drying.

Microwaves are radio waves. In the case of domestic microwave, the commonly used radio wave frequency is roughly 2,500 megahertz (2.5 gigahertz). Radio waves in this frequency range have an interesting property: they are absorbed by water, fats and sugars. When they are absorbed, they are converted directly into atomic motion and motion is converted into heat. Microwaves in this frequency range have another interesting property: they are not absorbed by most plastics, glass or ceramics. And metal reflects microwaves, which is why metals cause spark in a microwave oven. The reason that metal reflects microwaves is that no electronic waves reside inside of the conductor, as conductivity of a conductor is infinite.

Molecules of freshly harvested flowers consist of a dipole and have positive charge in one side and have negative charge in another side. If we apply electromagnetic fields on such material, all molecules are rearranged: +charge is to negative pole and – charge is to positive pole. In this process molecules produce heat by friction. Then microwave of 2,500 megahertz frequency change the direction of electromagnetic fields 2,500,000,000 times in 1 second. Consequently the heat efficiency of a microwave is greatly high.

In microwave heating, the radio waves penetrate the plant matrix (flower petals) and excite water and lipid molecules pretty much evenly throughout the petal matrix. There is no “heat to migrate towards the interior by conduction. There is heat everywhere all at once because the molecules are all excited simultaneously.

Materials and methods
This study was conducted in Horticulture College and Research Institute, Coimbatore. Fresh hibiscus flowers were harvested and its sepals were separated, weighed. Container is taken and sand or borax is filled upto 5 cm and the sepals were placed over the medium then covered by sand or borax. Then it is placed in microwave oven for 2.5 minutes and 3.5 minutes. After the heating the container was taken out and kept for 3 to 4 hours as setting time. Sand and borax is removed from the petals and weighed again.

Results
Among different media used Bougainvillea and Hibiscus showed better response in sand 2.5 minutes of drying. Eventhough sand gives good response borax can be used because in sand after drying the flowers become more brittle and sand particles are attached to flower petals.

Flowers placed in borax for 2.5 minutes were suitable for drying and making of dry flower products. Borax acts as drying agent without fading or colour change and gives high water content.

Table 1: Physical and physiological changes in flowers

Treatment	Media	Time	Flower	Colour	Fresh weight	Dry weight	Colour change	Score (out of 5)
T1	Sand	2.5	Hibiscus	Rose	0.204	0.070	Fully faded	2.5
T2	Sand	2.5	Bougainvillea	Pink	0.530	0.180	Same colour	1.0
T3	Sand	3.5	Hibiscus	Rose	0.218	0.102	Faded	2.5
T4	Sand	3.5	Bougainvillea	Pink	0.360	0.150	Slight change	2.0
T5	Borax	2.5	Bougainvillea	Pink	0.426	0.142	Same colour	5.0
T6	Borax	2.5	Hibiscus	Rose	0.205	0.090	Same colour	5.0
T7	Borax	3.5	Hibiscus	Rose	0.305	0.080	Same colour	1.5
T8	Borax	3.5	Bougainvillea	Pink	0.345	0.050	faded	1.0

Fig 1: Effect of drying Hibiscus and Bougainvillea using sand and Borax under microwave oven.

Conclusion

Among different media used, borax is suitable for drying at 2.5 minutes and these flower showed flexibility or retain as such without brittleness.

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